

*Case Report***Uterine cavity evacuation as a novel approach for uterine size reduction during minimal invasive surgery for uterine carcinosarcoma: a report of two cases**Alice Hue Chen<sup>1,\*</sup>, Lauren Turker<sup>2</sup>, Joseph DiVito<sup>3</sup>, Dennis Yi-Shin Kuo<sup>2,4</sup><sup>1</sup>Department of Obstetrics & Gynecology and Women's Health, Montefiore Medical Center, Bronx, NY 10461, USA<sup>2</sup>Department of Obstetrics & Gynecology and Women's Health, Division of Gynecologic Oncology, Montefiore Medical Center, Bronx, NY 10461, USA<sup>3</sup>Department of Radiology, Montefiore Medical Center, Bronx, NY 10461, USA<sup>4</sup>Albert Einstein Cancer Center, Albert Einstein College of Medicine, Bronx, NY 10461, USA\*Correspondence: [Alicehue.chen@gmail.com](mailto:Alicehue.chen@gmail.com) (Alice Hue Chen)

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**Abstract**

**Background:** Uterine carcinosarcoma often presents with significant uterine distention. This makes it difficult to perform minimally invasive surgery, which is preferred for uterine cancer given the significant recovery benefits. **Cases:** We present two cases of uterine carcinosarcoma in which we performed uterine evacuation intraoperatively to decompress the uterine volume to facilitate specimen removal through the vagina. The first patient ultimately had stage IA disease. She received adjuvant chemotherapy and radiation and has remained disease-free for 2 years. The second patient had stage IVB disease on final pathology report. She received adjuvant chemotherapy but had disease recurrence 4 months after completion of treatment. **Conclusion:** Intraoperative uterine evacuation during surgery for uterine carcinosarcoma may make possible a minimally invasive procedure in patients with large, distended uteri.

**Keywords:** Uterine carcinosarcoma; Minimally invasive surgery; Surgical techniques**1. Introduction**

Uterine carcinosarcoma (CS), also known as malignant mixed Mullerian tumor (MMT), is a rare biphasic neoplasm that accounts for 1.5–3% of all uterine malignancies [1]. These tumors are comprised of both epithelial and mesenchymal components. Patients are usually older with an average age of 75 years and often present with advanced disease.

The LAP2 study showed that minimally invasive surgery is safe for uterine cancer and has equivalent outcomes to open surgery [2,3]. Given the recovery benefits, minimally invasive surgery is the standard of care for uterine cancer when feasible and safe. Because of the aggressive nature of CS, it often presents with significant uterine distention and may even protrude through the cervix. These characteristics may make a minimally invasive approach a difficult surgical challenge.

We describe here two cases of uterine CS with significantly enlarged uteri due to tumor content. We opted to perform uterine evacuation during minimally invasive surgical staging in an attempt to avoid a mini-laparotomy incision.

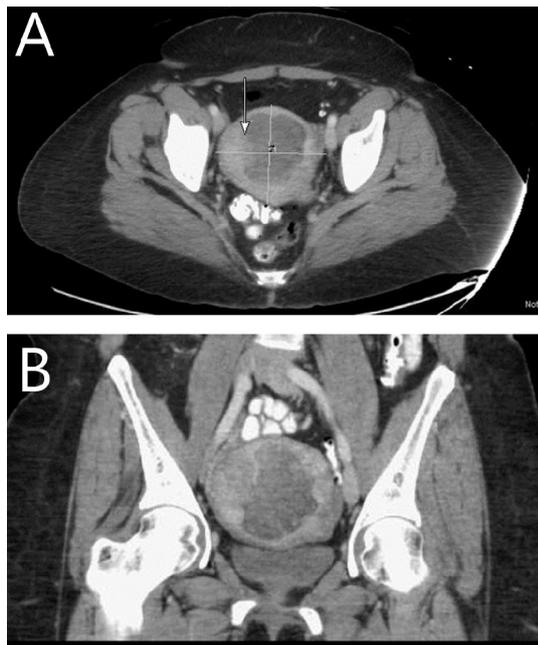
**2. Case report**

The first patient was a 62-year-old para 3 who presented to the emergency department with abdominal pain and 3 months of postmenopausal vaginal bleeding. Her body mass index (BMI) was 33.3 and her medical his-

tory was significant for hypercholesterolemia, hypertension, and a knee replacement. On pelvic examination, she was noted to have a 15-centimeter-long uterus as well as an enlarged and bulky cervix. An endometrial biopsy revealed CS with high-grade anaplastic carcinoma and high-grade chondrosarcoma, as well as other possible sarcomatous components including high-grade stromal sarcoma and leiomyosarcoma. Pelvic ultrasound revealed an enlarged uterus measuring 9.8-centimeters in length and the endometrial-myometrial junction obscured by a large 7-centimeter heterogeneous mass. A CT scan of her abdomen and pelvis similarly showed an enlarged uterus containing multiple myomas as well as the 7-centimeter heterogeneous mass within the uterus, suggestive of a tumor with components of varying density (Fig. 1).

The patient underwent a robotic-assisted total laparoscopic hysterectomy, bilateral salpingo-oophorectomy, pelvic and para-aortic lymph node dissection, and omental biopsies. Intra-operatively, the uterus was noted to be enlarged and globular with no macroscopic evidence of intra-abdominal dissemination or gross significant lymphadenopathy. An attempted delivery of the uterus via the vaginal canal was not successful due to the size of the uterus. The risk of spillage of uterine content was minimized by bringing the cervix to the vaginal canal when removing the uterine manipulator. With the assistance of the console surgeon, the uterus was stabilized and the cervix was kept in the vaginal canal while a tenaculum was placed





**Fig. 1. Initial CT scan images for patient with stage IA disease.** (A) Axial CT with IV contrast. Enlarged uterus with anteroposterior dimension 9.8 cm and transverse dimension 9.3 cm. Expanded hypo-enhancing endometrium suggests less enhancing solid mass except for right side enhancing component extending into endometrium that may be more solid (white arrow). (B) Coronal CT with IV contrast. Enlarged uterus with expanded hypo-enhancing endometrium.

on the anterior lip of the cervix. A 6-millimeter curette was then passed smoothly through the cervical canal without the need for mechanical cervical dilation. Three to four passes with the suction curette were sufficient to decompress the uterus and allow for its easy removal through the vaginal canal. The uterine evacuation was performed without any technical difficulties and took approximately three minutes. Direct visualization of the uterus using the robot laparoscopic camera was maintained for the entire duration of the uterine evacuation to confirm that uterine perforation did not occur. The entire surgical procedure was performed by a gynecologic oncologist and a first-year gynecologic oncology fellow, with assistance from a senior OBGYN resident. The patient recovered well post-operatively and was discharged the next morning.

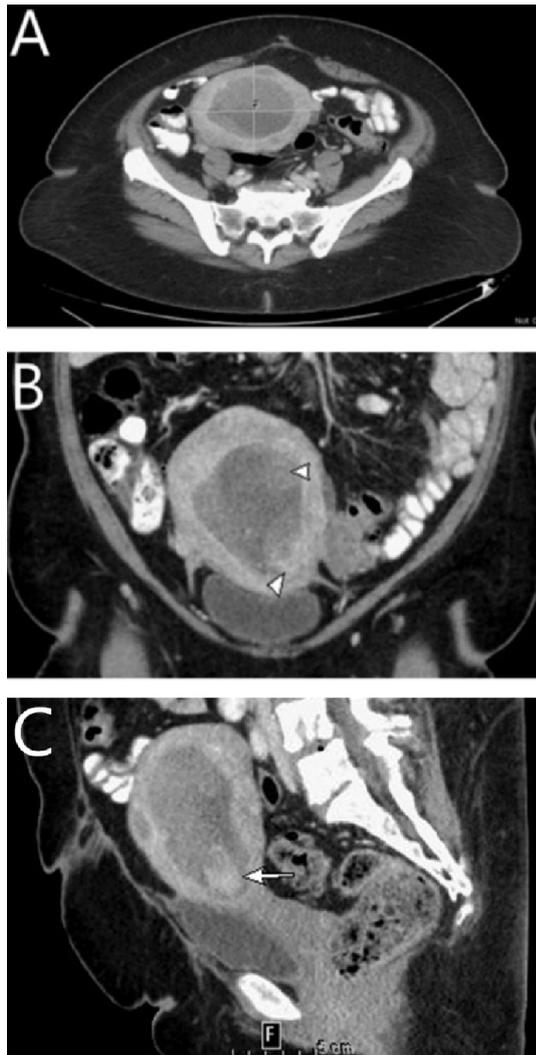
The final pathology report showed the enlarged uterus measured  $10.3 \times 6.5 \times 6.3$  centimeters. The total weight of the specimen consisting of the uterus, fallopian tubes and ovaries was 450 grams, inclusive of the uterine aspiration contents. The latter alone weighed 150 grams. Histologic examination revealed CS, comprised of anaplastic carcinoma with a high-grade sarcoma component. The tumor infiltrated less than 50% of the myometrium with no evidence of lymph node involvement. The fallopian tubes and ovaries were also negative for tumor content. No cervi-

cal involvement was noted, however examination revealed multiple mucinous-filled cervical cysts that accounted for the bulky cervix on pelvic exam. The pathologic stage classification was pT1a pN0 pMx and FIGO stage IA. The patient received adjuvant chemotherapy and radiation sandwich therapy using an in-house protocol. This consisted of 3 cycles of intravenous carboplatin and paclitaxel followed by EBRT (45 Gy) and brachytherapy (15 Gy). This was followed by 3 more cycles of intravenous carboplatin and paclitaxel. The patient has remained disease-free at 2 years of follow-up.

The second case was a 68-year-old para 3 who presented with post-menopausal vaginal bleeding for 6 weeks. Her BMI was 34.9, and her medical history was significant for hypertension, gout, and spinal stenosis. Pelvic examination revealed an enlarged 15-centimeter-long uterus. Endometrial biopsy showed a high-grade neoplasm consistent with CS with predominant serous carcinoma and minor high-grade stromal sarcoma components. Pelvic ultrasound revealed an enlarged uterus measuring 12.2-centimeter in length, as well as a thickened endometrial lining measuring 1.5-centimeter with a suspected endometrial polyp. CT findings showed a distended, hypo-enhancing, heterogeneous endometrium suggestive of tumor components that were less dense than surrounding tissue, and with no evidence of intra-abdominal metastatic disease (Fig. 2).

The patient underwent a robotic-assisted total laparoscopic hysterectomy, bilateral salpingo-oophorectomy, pelvic lymph node dissection, and omental biopsies. Intraoperatively, the uterus was noted to be enlarged and boggy with a small pedunculated fibroid. After freeing the specimen from all connections, there was difficulty in delivering the uterus through the vaginal canal *en bloc*. Being aware of the significant distention of the uterine cavity due to its tumor content, we again opted to bring the cervix to the vagina with the assistance of the console surgeon. We further stabilized the cervix in the vagina by applying a tenaculum to the anterior lip of the cervix to minimize the risk of spillage. Suction curettage was carried out to decompress the uterus in a similar manner to that described for the first case, thereby allowing delivery of the specimen through the vagina. The entire uterine evacuation until removal of the hysterectomy specimen from the vagina was again monitored by direct laparoscopic visualization to ensure that no uterine perforation had occurred. Surgery was performed by the same gynecologic oncologist and first-year gynecologic oncology fellow as for the first case.

The enlarged uterus measured  $15 \times 14 \times 8.5$  centimeters. The total weight of the specimen consisting of the uterus, fallopian tubes and ovaries was 462 grams. Histologic examination of the specimen revealed a carcinomatous component that was primarily serous carcinoma, a poorly differentiated carcinoma with neuroendocrine features, and a high-grade stromal sarcoma component. The tumor was noted to invade more than 50% of the my-



**Fig. 2. Initial CT scan images for patient with stage IVB disease.** (A) Axial CT with IV contrast. Enlarged uterus with hypo-enhancing endometrium with maximal anteroposterior dimension 8.8 cm and transverse dimension 10.9 cm. (B) Coronal CT with IV contrast. Enlarged hypo-enhancing endometrium suggesting less solid mass with areas of transmurular and internal enhancement that may represent a more solid component (white arrowheads). (C) Sagittal CT with IV contrast. Area of focal enhancing transmurular component and a possibly more solid component extending into the lumen of the lower uterine segment (white arrow).

ometrium with metastatic disease (high-grade serous component) found on omental biopsies and no lymph node involvement. Therefore, the pathologic stage classification was pT2 pN0 pM1 and FIGO stage IVB.

The patient was treated with three cycles of carboplatin and paclitaxel, after which she complained of significant neuropathy. As a result, paclitaxel was stopped and she completed two further cycles of carboplatin only. A CT scan performed one month after the completion of treatment showed no evidence of disease. However, three months later she presented to the emergency department

with subjective fevers and was found to have new renal failure due to obstruction from a large pelvic mass. Further imaging showed progression of disease. Her performance status deteriorated rapidly and a month later she was discharged to a hospice facility.

### 3. Discussion

Uterine CS typically presents in postmenopausal women with abnormal vaginal bleeding, abdominal pain or discomfort, and uterine enlargement [1,4,5]. In the two cases described, both patients presented with complaints of post-menopausal bleeding, had an enlarged uterus (although in part attributable to uterine myomas in both cases), were of African American ethnicity, and presented in their late 60s. The symptoms and demographic factors in both patients were typical of uterine CS.

We describe here our use of suction curettage at the time of surgical staging to decompress the enlarged uterus and thereby assist with specimen removal through the vagina during minimally invasive surgery. There are significant benefits for patients if minimally invasive surgery can be performed, including rapid recovery, shorter hospitalization, fewer minor wound complications, less blood loss, and better long-term quality of life [6,7]. Additionally, *post hoc* analysis of the GOG LAP2 trial concluded that recurrence and survival were not affected by the surgical approach used [3]. Therefore, minimally invasive surgery should be performed for uterine cancer when feasible. While CS only accounted for 3% of the patients in the LAP2 trial, the rarity of CS makes it difficult to study separately. CS often presents with an enlarged uterus with dilation of the endometrial canal [8], which can make specimen removal during laparoscopic surgery challenging. In the two cases presented here, uterine suction curettage was performed to reduce the uterine volume so that the specimen could be removed vaginally. To our knowledge, this method has not been reported previously in the literature for CS. We perform uterine suction curettage for the evacuation of molar pregnancies and hence are familiar with this technique. It is important to note that the standard of care for specimen removal when this cannot be achieved intact using a vaginal approach is through a laparotomy incision. However, we contend that the risk of spillage during mini-laparotomy for a specimen with a dilated cervical canal can be high due to the need to manipulate the specimen during laparotomy. Given the BMI and significant medical history of the two patients presented here, the use of a minimally invasive approach facilitated their recovery from surgery while we minimized the risk of intraabdominal tumor spillage that might have occurred during the procedure.

A theoretical concern is that abdominopelvic seeding of malignant tissue can occur due to retrograde flow or spillage in the vagina or pelvis during uterine evacuation. For both patients in this study, the cervix was brought into the vagina prior to suction evacuation. Consequently, min-

imal spillage was noted in the vagina and none was grossly visualized in the abdominopelvic cavity. The first patient has so far remained disease-free after two years, although this is by no means evidence to the contrary. The outcome for the second patient was presumably due to the late stage and spread of her disease at the time of diagnosis rather than the use of uterine evacuation at the time of her surgery. Use of a containment bag prior to uterine evacuation could potentially decrease the risk of malignant spillage into the vagina or abdomen. However, we believe there is also a theoretical risk of abdominal spillage with a dilated cervical canal when the specimen is pushed into the abdomen before containment in the bag. Another potential concern is the risk and subsequent effect of uterine perforation during evacuation on oncologic outcomes. We are unable to directly estimate the risk of uterine perforation during uterine evacuation. However, both uterine evacuation and uterine manipulator placement were performed under direct laparoscopic visualization in order to decrease the risk of perforation. Furthermore, the cervical canal was dilated in both cases, allowing easy insertion of a 6-millimeter suction cannula without the need for mechanical dilation. In the event of an unexpected uterine perforation during evacuation, abdominopelvic seeding could theoretically occur and cause iatrogenic cancer upstaging. This highlights the importance of performing uterine evacuation under direct visualization.

Finally, uterine contents that are sent as a separate specimen can present a challenge for accurate pathologic diagnosis. For example, the depth of invasion can be difficult to determine due to disruption of the endometrial-myometrial border. In both of the current specimens, the pathologists were able to evaluate the endometrial-myometrial interface as it was relatively undisturbed by the uterine evacuation. Detached fragments of malignant tissue were noted within the uterine cavity of the first patient, however this did not affect the evaluation of myometrial invasion.

Surgeons may generally be hesitant to offer a minimally invasive approach to patients with a large uterus due to the difficulty in delivering them vaginally. The novel approach presented in this report allows surgeons to potentially extend a minimally invasive procedure to patients with a large uterus due to intrauterine tumor contents. There is no absolute measure of uterus size for which the authors can recommend a cutoff for performing this procedure. Several factors must be considered including the presence, size, and location of fibroids; the patient's parity; and the width of the vaginal canal on bimanual examination. We believe the selection process must be individualized with consideration of the factors listed above. The success of the procedure is not clear until it is attempted. Removal of uterine content at the start could also facilitate the hysterectomy portion of the procedure and reduce concerns about tumor spillage into the abdomen. However, prior to hysterectomy it may not be easy to predict the level of difficulty in de-

livering the specimen through the vagina. We were able to perform uterine evacuation in a controlled manner and with minimal spillage by first moving the external cervical os into the vaginal space. Uterine evacuation prior to hysterectomy may be considered if significant uterine tumor content is seen on preoperative imaging. In any case, we recommend performing the evacuation under laparoscopic visualization, as this helps to mitigate the risk of uterine perforation. Finally, the approach described here may provide surgical recovery benefits. The overall effects on oncological outcome and prognosis do not appear to be compromised based on pathological assessment of the two specimens in this study, although further research with a larger sample size is needed.

### Author contributions

AHC—Investigation, Writing—original draft, Writing—review & editing; LT—Supervision, Writing—review & editing; JD—Preparation of radiologic images and figure legend, review & editing; DYSK—Conceptualization, Methodology, Investigation, Supervision, Writing—review & editing.

### Ethics approval and consent to participate

Written informed consent was obtained from both patients or their next-of-kin for publication of this case report and accompanying images.

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### Conflict of interest

The authors declare no conflict of interest.

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